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Paula Puffer
Iowa State University

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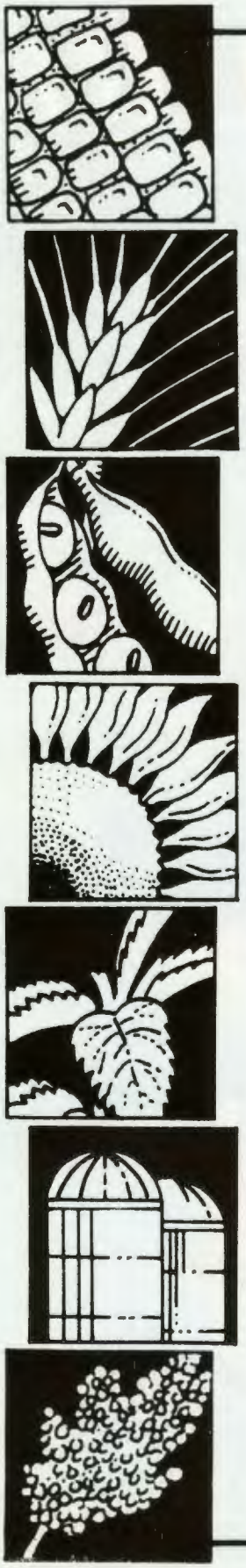
Agricultural Innovations in Developing Countries

ISU Takes a Look at the Swine Odor Issue

CIKARD: A Look at Indigenous Knowledge



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A Sri Lankan man pours engine oil into a green coconut to make a torch that will help to keep pests out of his rice fields. Photo by Patricia Matteson, Iowa State University, Collaborator, Department of Entomology.

EDITOR'S NOTE

Photo by Jason Walsmith

It's the time of year when we've been back at the grind of school for a couple of months. Seniors are in the midst of their final year, are busy interviewing, or already have a job lined up for after graduation. New students are no longer quite so obviously lost in the hub-bub of campus life. And the first issue of the *Iowa Agriculturist* is off the press.

For some of you, this is the first *Iowa Agriculturist* that you have seen. For others, it is one more issue in the long line of the magazine for the students of the College of Agriculture. I hope you enjoy this first issue of the 1994-95 school year. We are working hard to bring you information about agriculture at Iowa State.

As editor, I am aiming high this year for the *Iowa Agriculturist*. I would like to see more students from the College of Agriculture get involved in the writing, production, and day-to-day operations of the magazine. We are on a quest to report agriculture issues and on-going research and innovative developments at Iowa State. In addition to our regular professor profile feature, we have added a student profile. We've updated the Ag Directory to make it easier for you to make contact with ag-related organizations on campus. It is our way of saying "Look at what's going on in Iowa State's College of Agriculture!"

Next issue, I would like to publish a Letters to the Editor section so that the staff and I can better focus the magazine on the agricultural issues that you want to hear about. We'll also be able to respond to questions. Letters to the Editor can be sent to or dropped off at 16H Hamilton Hall, or submitted by e-mail to polly@iastate.edu.

This issue's focus is innovations and solutions. "Agricultural Innovations from Developing Nations" looks at how farmers in south Asia, Burkina Faso and India solve problems such as pest and erosion control while keeping ecological issues in mind. "Not in my Backyard," comes back to Iowa and Iowa State to examine the growing concern of swine odor and its effects. The professor and student profiles look at changes occurring in the agronomy department through the activities of Dr. Russ Mullen and Kirk Schekel. "CIKARD" looks at the multi-disciplinary work that the Center for Indigenous Knowledge for Agriculture and Rural Development is performing at Iowa State and around the world.

Finally, I would like to mention a change of advisors for the *Iowa Agriculturist*. Over the summer, Veryl Fritz resigned as advisor to concentrate on his work in the journalism and mass communications department. We would like to thank Veryl for his help over the last ten years and wish him the best of luck in the future.

We would like to welcome Karen Bolluyt and Lulu Rodriguez on board as our advisors. Karen began her career at Iowa State 15 years ago as a writer for Agriculture Information Services. Currently, she manages Agriculture Information Services. Lulu joined the faculty of the journalism and mass communication department in the fall of 1993. She teaches a graduate course on communication strategies and an undergraduate class on visual principles.

Paula Puffer
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The *Iowa Agriculturist* staff sees our magazine as a service to you, the students in the College of Agriculture at Iowa State University.

Agricultural Innovations From Developing Countries

Jonathan Sandor

Vetiver grass and stone bunds help create and stabilize terraces such as these maize terraces in Peru.

By Paula Puffer

Pretend for a moment that you are a farmer in a developing nation. You do not have access to Western or European technology. Nor do you have access to large sums of money to purchase things such as commercial pesticides or PVC pipe for irrigation. Consider the following questions: How would you stop soil erosion if you were in India? What would you use for a pesticide in Burma? How would you decrease runoff in your fields while increasing the fertility of your land if you were in Burkina Faso?

Farmers in these areas of the world have a tradition of experimentation and developing the answers to such questions. According to such organizations as the World Bank and the Soil Conservation Service of the U.S. Department of Agriculture, these farmer solutions may be ingenious and often influence their environments in positive ways through the use of plants and materials found in their ecosystems. In India (and several other countries), vetiver grass is stopping soil erosion and serving other purposes. The neem tree is providing a nontoxic, biopesticide in many tropical climates. In Burkina Faso, stone lines called bunds help to decrease runoff and soil erosion while increasing soil fertility.

Vetiver Grass

For at least 200 years in south Asia, Indians have been using vetiver grass as a method of controlling soil erosion. Vetiver grass, a plant probably native to the swampy lowlands north of New Delhi, has been used for several centuries as a medicinal plant and as a source of one of the essential oils for scenting perfumes and soaps. Vetiver grass also was known to be useful in strengthening the banks of ponds, rivers, canals, and

rice paddies. A vetiver grass hedge is permanent enough that it can be used as a legal boundary marker in some places. The spread of the use of vetiver hedges with contour farming is relatively recent.

Vetiver grass was used before World War II as a contour hedge in the British Caribbean sugarcane fields. This technique was brought over to the Caribbean by south Asian immigrants. However, this technique was "lost" through the disruptions of war and the fall of colonialism. Many agricultural advisors left the tropics taking the knowledge of this technique with them. It wasn't until 1956, when researcher John Greenfield was working for a sugarcane company in Fiji, that the benefits of a vetiver grass hedge in combination with contours were rediscovered and documented.

Greenfield was given the task of growing sugarcane on the hills of Fiji. The sugarcane company Greenfield worked for had all the available flat land in production and decided to expand up the slope. The hills of Fiji were very erodible, and the soil was too dry for growing sugarcane. Everyone but Greenfield's boss knew this. Greenfield tested several erosion control methods (including broad dirt barriers called berms) even though he doubted any would work well enough to enable him to grow sugarcane on the slopes. Greenfield had seen vetiver grass used in the Caribbean sugarcane fields and decided to test contour hedges of vetiver grass on the slopes of the Fijian hills.

Greenfield located some vetiver plants growing along a highway, had his crews dig them up, break off slips, and plant the slips side by side to form a contour line across the hillside. The vetiver slips took root quickly and grew together to form continuous bands along the contour. The botanical dam created by the thick hedge of vetiver grass caused the water to slow down. The stalled runoff seeped through the plants, and soil was allowed to settle behind the grass eventually forming stable terraces. These terraces are still in production after 38 years.

Since this initial experiment, Greenfield has taught the technique of vetiver grass hedges to farmers in many parts of the world. In India the vetiver hedges were hesitantly accepted at first, but when farmers saw how successful the technique was they soon were demanding planting materials. Since the late 1980s organizations such as the World Bank, have helped to foster vetiver use in China, the Philippines, Malaysia, Thailand, Laos, Indonesia, Sri Lanka and Nepal. One reason for this widespread success is that vetiver is a very tough plant that can survive neglect, a number of different soils, different climates and third-world hazards such as cattle trampling.

Farmers who use vetiver grass have developed other uses for it. The strong aromatic oil makes the grass unpalatable to rodents and other pests. In Kericho, Kenya, it has been shown that a mole rat cannot stand a vetiver root in its burrow and will block off the tunnel that the root is in. The aromatic root and oil also has been shown to repel insects.

The World Bank suggests that this plant be studied for further uses that would make it even more attractive to farmers.

In Burkina Faso, using stone bund systems has raised sorghum yields 40% in some fields

Neem Trees

Scientists have been studying neem for 20 years and are just beginning to realize the potential of this tree. In India and Burma, the neem tree has been used for centuries as a safe method of controlling insects in the field and in grain storage. Neem has also been used medicinally as a tonic and the leaf juice used as an ointment on skin disorders. It also has been incorporated into commercial products such as toothpaste and soap. Because of the ability to relieve so many different pains, fevers, infections and other complaints, it has been called "the village pharmacy."

Native to India and Burma, neem is a botanical cousin of mahogany. It is tall and spreading like an oak tree. It bears white flowers and fruit that resembles olives. Although the seeds are viable only for a short period of time, early in this century, neem was introduced to West Africa and other parts of the world. Neem is a leading candidate to help halt the migration of the Sahara desert. In the Caribbean, neem is being used to help reforest several nations. Neem's most promising product may be a biopesticide that harms insects while not harming humans and animals. In locust swarms, neem trees have been left untouched while every other plant in the area has been stripped bare of foliage.

The leaves and seeds from this densely foliated tree carry several natural pesticides. The biopesticides are easily extracted from the fruit of the neem through the use of water, a couple of commercial solvents, or alcohol. The fruit or leaves are ground or crushed and then soaked with the extract. Water extraction is the most promising method to be used in developing nations because of cost, even though alcohol extraction provides the most concentrated forms of the natural pesticides.

These natural pesticides bear no resemblance to synthesized pesticides, and they are unique because they do not kill pests outright. The pesticides, because they resemble the natural growth hormones of many types of harmful insects, alter an insect's behavior or processes in subtle ways so that the insect can no longer breed, eat, or metamorphose. Chemically, the pesticides resemble steriodal compounds similar to cortisone and birth control medications. The four most active ingredients are azadirachtin, salannin, meliantriol and nimbin.

Azadirachtin is neem's main ingredient for battling insects. It seems to cause 90 percent of the effects on most pests. By repelling the insects from the neem foliage and disrupting the growth and reproductive cycle of harmful insects, azadirachtin has earned recognition as one of the most potent growth regulators and feeding deterrents evaluated by researchers in the last 20 years. It will repel or reduce the feeding of many pest insects and some species of nematodes as well. Research shows that some insects will not even touch a plant if a mere trace of azadirachtin is present.

Azadirachtin is similar to insect hormones called "ecdysones." These hormones control the process of metamorphosis as the insects pass from larva to pupa to adult. Azadirachtin acts as an "ecdysone blocker." It blocks the insect's production and release of these vital hormones, so the insect will not molt properly and it breaks its life cycle.

Meliantriol and salannin act as feeding inhibitors. Meliantriol, in very low concentrations, causes insects to stop eating. Its ability to stop locusts chewing on crops was the first scientific proof for neem's traditional use for insect control on Indian crops. Salannin also inhibits the insect's desire to eat, but it doesn't affect the insect reproductively. Laboratory and field tests show that salannin greatly deters pests such as the migratory locust, the striped cucumber beetle and houseflies.

Stone Bunds

In Burkina Faso, Mossi farmers are using stone lines called bunds in combination with pits, called zays, to help curb soil erosion, increase water infiltration, and increase soil fertility. Burkina Faso has a low annual rainfall. Rainstorms in this region of west Africa are intense, and rather than being absorbed into the soil, the rain often runs off. The bunds act as dams, allowing water to flow through the fields at a slower pace and crops to absorb the rain more efficiently. The stone bunds in some places reached a meter high and created an effective system of terraces on the slopes.

The zays help increase water infiltration and soil fertility as well. Farmers dig a series of pits that are approximately a foot across and a foot deep. The farmers place manure in the pits. The manure attracts termites. The termites digest the manure and start digging through the soil. The digestion of the manure increases the soil fertility and the tunneling increases the soil's infiltration capacity.

This approach to indigenous agriculture was developed in the early part of this century but was abandoned after much political turmoil and environmental crises due to drought. After a series of droughts in the 1970s, farmers in this region revived the use of bunds and zays.

Proof of the success of the bund and zay combination came during the droughts of 1983 and 1984. Fields that did not have bunds in place yielded nothing while fields next to them had crops. This method has impressed British and United Nations aid agencies, which gave funds to help teach other farmers in Burkina Faso how to use the techniques. Approximately 150 villages on the central plateau now have the stone bunds and even more results are being seen. In the fields that have the bunds, sorghum yields on the plateau has risen approximately 40 percent.

All information in this story came from materials obtained from CIKARD, Room 318 Curtiss Hall, Ames, IA 50011.

Tell us what you think!

We would like to let you know about a new feature for the Iowa Agriculturist, Letters to the Editor. Write us or e-mail us and let your insights be known!

Comment on our current stories, future story ideas, or any other topic that needs to be discussed. Send or drop off letters at 16H Hamilton Hall, or e-mail us at polly@iastate.edu.

Paula Puffer

The storage lagoon for this swine confinement facility near Iowa Falls is located beneath the building. Tim Broer, owner and College of Agriculture alumnus, said he believes that lagoons located under buildings don't smell as much as other lagoon options.

Not in A Look

by Darcy Dougherty

Black-outs. Depression. Tension. Anger. Swine odor. Swine odor? What does swine odor have to do with these disorders? Plenty, according to the Knight Ridder news service: "Pigs can kill... Scientists say the stink from porcines can make people depressed, cause blackouts and suffocation... People living downwind of a large pig farm were said to be unusually tense, depressed, and angry." (*Pork '94*, Aug. p 5)

Recently certain media sources have tended to present the negative side of a pork production issue: the odor problem associated with hog confinement facilities. Why has swine odor suddenly become a focus of attention? Hogs don't smell any worse now than they did twenty years ago. What's going on?

While hogs haven't changed, some people's attitudes have. The urbanization of America has played a role in this change. Marlys Miller, editor of *Pork '94*, notes that as the nation has progressively become more urban and less rural, many people no longer consider hog units to produce the smell of money. They feel these units produce an odor nuisance.

An increasing number of rural residents themselves have also become less willing to live with livestock odor. No longer is every rural resident directly involved with farming. Marlys Miller succinctly explains, "People are less tolerant of an inconvenience when their livelihood doesn't depend on it."

The stakes involved in the swine odor issue are high. In Iowa, hogs are big business. The pork industry creates 85,000 jobs and produces $10 to $11 billion in hog-related economic output each year. "Raising hogs is what we do for a living in Iowa," states Jim Ledger, former president of the Iowa Pork Producers Association. "Regulations that reduce the profitability in this industry will have a dramatic impact on our state's economy."

Managing swine odor is on the minds of producers and researchers in Iowa as well as around the world. This past summer, organizers at Iowa State University took a step to address this problem. On June 14 and 15, an international group of scientists and researchers met in Ames to compare ideas and exchange possible solutions to the odor problem. The International Round Table on Swine Odor Control, a first-ever event, brought out questions as well as answers, but participants demonstrated a true commitment to finding solutions.

"We had a good exchange of information and a chance to stimulate interest in exploring new ways to control swine odors," said Stewart Melvin, co-chair of the round table and interim head of the agricultural and biosystems engineering department at Iowa State.

My Backyard at the Swine Odor Issue

Conference participants at the Ames meeting concluded that the pork industry needs an odor standard. Researchers need to determine exactly what a bad odor is and discover the ultimate source(s) of odors. Melvin emphasized the importance of learning how odors affect the human sensory system. Researchers are presently facing the challenge of determining the chemical complexities of odors and understanding what elements are offensive to humans.

Because there is presently no industry standard, an odor nuisance is determined largely by an individual's odor tolerance. To make the process less subjective, researchers are examining various measures for evaluating odor. British scientist Philip Hobbs is trying to measure odor by using technology known as an electronic nose. Other researchers are relying on trained human odor panels.

Swine odor is not standard in all hog operations. Some hog facilities produce more odors than others. Melvin noted that there is a wide variation in the odor produced by swine production facilities. "Some facilities have very little odor associated with them. Design, management, nutrition, climate and other factors all play a role," he said.

Knowledge of why some hog facilities produce more odor than others will assist researchers in finding a workable solution. In a search for this information, scientists at the Iowa State conference identified the following areas for further study and hope research in these areas will offer answers to the odor problem:

Brian Meyer, ISU Ag Info Services

Governor Branstad speaks at the International Round Table on Swine Odor Control.

- The ultimate source of odors needs to be identified.
- A standard method for measuring odors needs to be developed so that researchers can compare results between one area or country and another.
- Researchers need to learn if dust particles contribute to odor.
- More information is needed about the microbiology of swine waste management. Researchers need to learn how microbes interact in a pig's gut and in manure. They also need to identify odor-related compounds made by microbes.
- Solutions to odor problems need to be economically feasible. Long-term costs of odor solutions need to be identified.
- Many disciplines, including meteorology, microbiology, forestry and biochemistry, need to work together to develop criteria for identifying the best locations for new swine facilities.
- The impact of facility size and space and animal numbers on odors and gases needs to be determined.
- The effects of seasonal climate changes on odors need further study.
- Researchers need to develop storage lagoons that minimize odor and gas production. They need to identify the optimum combinations of size, depth, temperature and microbial activity.
- More effective management techniques are needed for deep-pit systems.
- Researchers need to identify health considerations for rural areas.
- Researchers from around the world need to share expertise and experience to solve and avoid future odor problems.

In the quest for answers, Melvin stressed, "ISU is doing all it can to find solutions." Iowa State researchers are working on odor control methods ranging from pre-treatments to composting possibilities. Researchers are

testing a variety of different odor control products to see which ones, if any, are effective. David Topel, Dean of Iowa State's College of Agriculture, reports that this testing process is hindered by the fact that manufacturers cannot patent their odor-control products. Consequently, many companies guard their odor control products' ingredients as top secret. Researchers are trying to determine which of these products have merit and hope to make their findings available soon.

In some cases, swine waste management can be more accurately considered nutrient management. Lauren Christian, director of the new Iowa Pork Industry Center at Iowa State, stated that composting the solids in swine waste is one example of this. Solids, once composted, become odor-inert. They can then be sold for mulch. They are odor-free and have additional value as fertilizer.

Turning swine waste into crop fertilizer is another example of nutrient management and odor control in one. Topel noted that holding pits, in which waste is semisolid, may be preferable to lagoons because the waste (potential fertilizer) can be removed periodically and injected into fields. "When waste is injected six to eight inches into the soil, this reduces odor significantly, eliminates run-off, and is very environmentally sound," explained Topel.

Brian Meyer, ISU Ag Info Services

Heinrich Mannebeck explains how odors circulate and how humans are able smell at the conference.

Further solutions to swine odor management may come from the area of microbiology. Researchers are investigating how certain naturally occurring microflora in lagoons reduce odor. Christian noted that certain microbes that form on Iowa lagoons during the summer help to reduce odor. They do this by locking up the sulfur in swine waste. The task of researchers will be to isolate microbes of this nature, learn how they function, and determine if or how they can be used for odor control.

Covering storage basins is yet another potential way to control swine odor. Covers prevent the air that flows over the tops of lagoons or pits from mixing with the odor-rich gases given off by the waste. The covers prevent odors from being transported downwind.

Plastic covers are used at an Iowa State's pork farm to help reduce odor. Topel stated that data have been collected on this farm for the past two years, and out of an entire year, odor is present only seven days.

Covers also can be composed of natural materials. Peat moss, commonly used in Canada, gives an eighty percent reduction in odor when the moss layer is 10 to 12 inches thick. Covering a storage basin with straw can offer a fifty percent odor reduction.

The location of swine facilities may come to play an important, cost-effective role in preventing major swine odor problems. Researchers are conducting tests to determine how far odors can carry and are working to mathematically model how odors are transported and dissipated. These test results may lead to another possible solution: the correct positioning of buildings away from residences in accordance with zoning laws to avoid the need for special, potentially costly, odor treatments.

One of producers' biggest concerns regarding swine odor management is its economic feasibility. Lauren Christian addressed this while remarking on the Round Table conference. "We wanted to determine what research has been done [concerning swine odor] and what we still need to know. With that information we can begin to design a plan to scientifically determine the unknowns, which we hope will lead to low-cost, effective systems to control swine odor."

Christian, like pork producers, realizes the importance of weighing the economics of any odor safeguard. Producers obviously can't go out of business trying to create odor-free hog operations.

Nor should they have to. Dwaine Bundy, an Iowa State researcher, warns that producers shouldn't strive to create odorless operations; a better solution is to aim for a minimum level of odor. "That [zero odor] is not the ultimate goal. You should aim for a minimum level of odor."

Before going to more extreme measures, Melvin states that producers should first concentrate on sound management practices to control odors. Proper manure management is the best place to handle odors before they become a problem. Just as antibiotics can't make up for poor swine herd health management, odor-control products won't replace proper manure management.

Lauren Christian emphasizes, "I don't think there are any quick fixes out there. One of the best ways to reduce odor is to properly size lagoons. Many odor problems result from overloaded lagoons that are too small." Proper lagoon size plays a vital role in odor control.

Jim Barker, an agricultural engineer at North Carolina State University, notes, "Lagoon design and management, along with manure management inside facilities, are the main areas producers need to work on to reduce odors." Echoing Christian's statement, Barker says that too many lagoons he sees are too small to function properly and, as a result, create unnecessary odor. Common sense and quality management remain the basic keys to odor control.

Iowa State knows firsthand how seri-

ously some people take swine odor. In 1990, rural residents living by Iowa State's Swine Nutrition and Management Research Farm west of Ames brought a lawsuit regarding the swine odor produced by the facility to district court in Boone. The Iowa State farm was ruled a nuisance. The judge ordered Iowa State to put covers on the facility's waste storage container and stated that nutrients from the container couldn't be applied within eighty acres of the plaintiffs' homes.

In a subsequent case, the four plaintiffs in the case went after money, each wanting $250,000 in damages. The judge awarded each plaintiff $6,000. Still not satisfied, the plaintiffs are appealing the case to the Iowa Supreme Court. The case hasn't come before the court yet, however.

The plaintiffs in this swine odor case actually brought suits before hogs were even moved onto the Iowa State farm. Further, the plaintiffs were renting some of the buildings on their rural residences to pork producers who raised hogs in these buildings. Dean Zimmerman, manager of the Iowa State swine farm, commented, "I would wager to guess that the plaintiffs were smelling their own hogs more than ours."

As the odor issue continues to present a problem in rural America, ISU will continue to try to find solutions. ISU is working to solve odor problems for producers and non-producers affected by the livestock industry. Results from the round table, for example, will be shared with the task force studying environmental issues in Iowa's livestock industry, which will make recommendations to Governor Branstad later this year. David Topel is heading this task force.

Economically feasible, practical solutions to the swine odor problem need to be found. Melvin feels that better management practices and a little more tolerance are steps in the right direction. He poses the question, "Just because I live in the country, can I expect to have no odors show up on my doorstep? People in town don't have this luxury. Society must make a decision soon."

SWINE PANEL DISCUSSES ODOR PROBLEM DURING AG WEEK

By Darcy Dougherty

On Nov. 10, 1994, Iowa State University hosted a panel discussion concerning "The Changing Swine Industry in Iowa." Concerned students and citizens filled the Great Hall of the Memorial Union, anxious to hear panelists' views about the future of the hog confinement industry in Iowa. The symposium was sponsored by the ISU Collegiate Farm Bureau Club and was the finale of this year's Ag Week.

The panelists included Lauren Christian, director of the Iowa Pork Industry Center at Iowa State; Mike Duffy and John Lawrence, ag economists at Iowa State; Lindsey Larson, an Iowa farmer and member of the Governor's Environmental Task Force; Paul Lasley, Iowa State sociology professor; Conley Nelson of Murphy's Family Farms; and Jay Wagner of *The Des Moines Register*.

The symposium dealt with three areas: (1) the economic effects of large corporate swine farms in Iowa, (2) the environmental effects of large swine units, and (3) the sociological effects of large corporate swine farms on rural Iowa. The six panelists commented on each topic and addressed audience members' questions at the end of the symposium.

Panelists agreed that hogs are big business in Iowa. Lawrence noted that the swine industry generates $12 billion and 50,000 full-time jobs (not counting the processing sector) in Iowa. Panelists also agreed that corporate swine farms, which are playing an increasingly large part in this industry, have generated concern about the future of the smaller producer. But, panelists emphasized that small producers *can* compete with large corporate farms. "Animals are a very important part of Iowa's economy, and a producer doesn't have to be big to be efficient," said Duffy. A recurring theme was that efficient pork producers will be the successful producers.

Christian echoed Duffy's sentiments. While conceding that economies of scale do exist in the pork industry, Christian said that good records, modern technology, volume purchases of goods, quality genetics and effective management can help smaller producers stay competitive.

Nelson said that Murphy's Family Farms plays a role in helping Iowa stay competitive in the hog business through its emphasis on technology, research, and development. "This is just one way to produce pork in an economical way," he said.

Unlimited growth isn't necessarily the future trend in the hog industry, panelists said. Duffy explained that corporate hog farms have been getting bigger in part because certain costs, namely externalities like odor and potential water pollution, haven't been accounted for. "Odor will be the guiding principle in the future of hog production," Christian stressed.

Panelists agreed that producers need to develop suitable nutrient management plans to prevent odor and water pollution. A variety of plans were presented, including composting, careful building site selection and injection of swine waste in the soil. Duffy emphasized the practicality of Iowa farmers using swine waste as fertilizer. He explained that sustainable agriculture in Iowa can mean raising corn, feeding the corn to hogs and then using swine waste to fertilize soil for the next corn crop.

While swine odor is a hot topic now, Lasley noted that many producers have never received odor complaints from their neighbors. In fact, he reported that some of those who are complaining are just using the odor issue to fight old feuds. "The Hatfield and McCoy feud is alive and well. We've just exchanged manure for guns."

When it comes to odor, panelists agreed that the big issue is the lack of a "good neighbor" policy. This issue applies to both large and small producers. Lawrence offered the analogy of leaving one's dirty boots outside on the steps so as not to track filth through the house. "A good neighbor leaves his boots outside, and if he's a good neighbor it won't matter how big his feet are."

Panelists concluded that Iowa has the potential to be the most competitive hog producer in the world, but with this potential comes responsibility. Lasley summed up this point by saying, "We need expansion that respects community, neighbors, and the environment."

PROFESSOR PROFILE

ALWAYS MORE TO LEARN

By Jen McCarroll

Russell Mullen often gets asked how he can teach the same class year in and year out without getting bored. Mullen looks at his teaching responsibilities not only as a chance to teach but as a chance to learn. Mullen said that he feels that his work with students and the community work he does in Gilbert helps him to learn and be innovative. The drive to be innovative and to teach can be seen in Mullen's recent work with the Agronomy 114 course materials.

Agronomy 114 has taken up most of his time in the last few years.The 250 students in the class attend lectures and a hands-on lab that gives students experiences with plants and weeds and allows students to have individualized instruction with Mullen or one of the teaching assistants. Students can come in and work in the lab when they want to. "The lab is open 32 hours a week to provide a lot of flexibility to work around student schedules and other classes," said Mullen.

Six years ago, Mullen developed a video series to help students learn the agronomy skills featured in the lecture. "The video helps to illustrate the concepts, especially for non-farm students. We've made a big effort to help students in any way," he said. Since the video series has been completed, it has won three awards. The first two awards were recieved from the American Society for Agronomy for the Best Educational Videos over 30 minutes long on the subjects of crop physiology and crop anatomy. The third award is the Agricultural Communicators in Education or ACE award. It was awarded for the soil/water segement of the video series.

Paula Puffer

Russ Mullen and agronomy graduate student John Keiser discuss a problem on a quiz with Kristine Mattson, a dairy science/prevet student.

While making the video series, Mullen realized that the book was "old and out-of-date." He has spent the last two years working on a new textbook for the class. The new text is due out in January. When Mullen was rewriting the book, anthropology graduate student Mary Holmes, who's graduate research focuses on the intersection of cultural, ecological and agricultural systems, helped to make Mullen aware that the course materials were more production oriented and not looking at environmental and agricultural sustainability issues. A two-year grant from the Leopold Center enabled Mullen to integrate these issues into the Agronomy 114 materials and make them an intergral part of the course.

Mullen is also working with Kirk Schekel on an Agronomy 490 independent study developing a computerized Agronomy 114 exam preparation program called ABC. When its finished, the program will help students be able to learn the materials better by giving them hints about the questions they missed on the testing program.

Mullen also teaches Agronomy 330 and Agronomy 331. Mullen's Agronomy 330 class is a plant, seed, and weed identification course. Students spend class time in a combination of lectures and labs learning how to identify plants and weeds and how to evaluate crops when in the field.

Agronomy 331 is the Intercollegiate Crops Team for which Professor Mullen is the faculty advisor. The crops team members attend competitions where they compete against other colleges, answer questions about grain and seed quality, and identify plants and weeds. "Any college can form a team, but it takes a lot of work and commitment," Mullen said.

Another part of Mullen's job here at Iowa State University is research. He is studying stress physiology on soybeans. This research includes the effects of weather on soybeans, the protein and oil composition changes and the germination of soybeans due to the weather. Mullen and his graduate students work on this project year around.

Mullen has been a member of the agrononmy faculty at Iowa State University for 16 years. "It doesn't seem that long to me," Mullen said. "It is one of the best jobs I could have anywhere because I'm interested in agriculture." He has wanted to teach since he was in graduate school, when he had his first teaching experience.

Paula Puffer

Mullen discusses water conservation with his class.

Mullen grew up in southwest Iowa, but went to Northwest Missouri State. He attended Northwest Missouri State until he received his masters degree. "I don't want to say that too loudly around here," said Mullen. While in college, he returned home on weekends and breaks to work on the family farm. Mullen still goes to his family farm to work sometimes. Last summer, he spent a week running the family farm while his brother's family went on vacation.

From Northwest Missouri State, Mullen went to Purdue, where he received his Ph.D. in agronomy. He taught his first class at Purdue. His major professor took a leave of absence, and Mullen took over his class. "I didn't know if I would like the professor kind of life," Mullen said. After his first class Mullen decided he did. "I've always been a shy person. Teaching was my way of getting over it," said Mullen.

Mullen went on to teach at the University of Florida, where he was a faculty member in the agronomy department. "It was a good professional experience," he said. While at the University of Florida, Mullen saw an advertisement for the position he currently holds. "When I first saw the advertisement, I basically threw it in the waste paper basket," Mullen said. "After talking to my wife, I decided to apply for it." Mullen liked ISU when he came here for his interview. "I have never seen such a group of people who feel so good about what they do," he said . Mullen became a faculty member in 1978.

Mullen and his wife, Michelle, live in Gilbert, Iowa, and have three children. Mrs. Mullen "keeps the household going," he said. She has her own pottery studio and teaches pottery classes. She also works with the elderly, teaches cooking and art classes for the mentally and physically disadvantaged, and is the religious education director for St. Peter and Paul Catholic Church where Mullen also teaches religious classes to eighth and ninth graders. Mullen said "It really made me appreciate my college students. Teenagers see things as black and white with little or no shades of grey. They aren't able to reflect on things as well as my students."

The Mullen's oldest daughter graduated from Iowa State and received a degree in finance. Their son is a senior, and their youngest daughter a freshman, at Gilbert High School.

Part of Mullen's leisure time is spent watching his kids particpate in school activities.With the rest of his spare time, Mullen fishes, hunts, and does volunteer work in the community. Since, Mullen has been working on the book he hasn't had much of a chance to hunt or fish, but he has continued his volunteer services in the community. He was the chairman for the "Lights over Gilbert" fundraiser. This two year fundraiser successfully put lights over the baseball and softball diamonds and allowed for the repair of the track and football field lights.

Mullen said he thinks he will return to the family farm he grew up on when he retires. "I was always going to the farm after college, then after my masters and after my Ph.D."

STUDENT PROFILE

THE ABCs OF AGRONOMY 114

By Angela Hopkey

"Computers offer me a challenge. There is always something new to learn," says Kirk Schekel. When Schekel saw an updated, computerized, testing system in one of his classes, he approached Russ Mullen, professor of agronomy, about doing the same with the Agronomy 114 testing system. Schekel said he thought the updated system would help students learn their Agronomy 114 materials easier and began working on the update this fall as an Agronomy 490 class. The computerized testing system, known as the ABC program, consists of questions compiled from old exams. "It [the program] gives the students more of an idea of what is going on," said Schekel.

Paula Puffer

Kirk Schekel works on the ABC program for the Agronomy 114 class.

Throughout high school and college, Schekel has experimented with computer programs and even developed new programs for his and others' benefit. For his FFA chapter, Schekel wrote a computer program for the parliamentary procedure team. Schekel's program was designed to describe a situation to the student, and then allow him or her to explain what the next steps in the parliamentary procedure would be. "It [the program] was a way team members could practice on their own to prepare for the contests," commented Schekel.

Schekel has always enjoyed teaching and helping others. Growing up in a rural town and being involved in agriculture, Schekel realized that not all students were given the opportunity to use and be familiar with a computer. Schekel said, "I hope this program exposes ag students to the computer world and gets students started early using Vincent. (See box at the end of this article for more information on the Project Vincent computer system.) Then hopefully they will go use it on their own."

Schekel began to learn about the ABC program last spring. For most of the first month, he studied the program. With suggestions from Mullen and assistance from Pete Boysen, a computer specialist, Schekel began to sort the program out slowly. "It's a learning process for everyone involved. Dr. Mullen encouraged me to do something different, and he is very excited," replied Schekel. The next step was to gather questions from old exams and type them into the computer.

The ABC program groups test questions into files according to the chapters in the Agronomy 114 book. The student chooses which chapter, such as plant genetics, he or she wants to review and then decides how many questions he or she wants to answer. Each answer receives points. A wrong answer receives zero points, while a right answer gets one point. Each question can be answered twice, and questions missed can be reviewed.

Schekel is still learning new things about the ABC program. "It was a new experience, but the program is fairly user-friendly," commented Schekel. Schekel may understand the basis of the program, but he still has many ideas for improvements. He wants to begin by adding a "hint option," where a sentence of advice will be given to help students select the correct answer. Visuals and graphs also will be added. "This program is nice because I have a solid base, and when I leave, the next person can edit it more easily," said Schekel. He hopes the finished product offers students a unique way to study for exams. "I've tried to make the program simple so students don't get frustrated and can flow through it smoothly," stressed

Schekel.

Schekel's next step is to instruct Mullen on how to update the program for future years. Schekel commented, "It's like being a teacher to the teacher!" Many other professors have displayed interest in setting up a program to fit their courses. In the future, as classrooms become computerized, this type of program may be a way of giving tests.

Schekel is a senior majoring in agronomy. He is also a member of the Agronomy Club, Fraternity Council, Student Alumni Association, and is president of the Adelante fraternity. Schekel volunteers for community service projects that Adelante fraternity and other Greek houses on campus are involved in.

Schekel grew up in Maquoketa, Iowa, on his family's farm. He became active in 4-H in sixth grade, and in FFA as a freshman in high school. Along with a lot of fun and new friends, these organizations have given him a strong sense of responsibility and have taught him to be a hard worker.

Schekel always admired Jene Zobel, his FFA advisor. "My FFA teacher was a big inspiration to me. He passed away my first year at college, which was really hard. He was always one to promote leadership and involvement," said Schekel. Schekel said he believes that his FFA advisor helped to develop him into the hard worker that he is today.

Schekel's future plans include graduating from Iowa State University in May and continuing his education in graduate school at Berkeley, Texas A&M, Purdue, or North Carolina. His goal in life is to be a professor of agronomy.

"Doing this program has been a benefit for students and myself. I've learned a lot too," said Schekel.

Project Vincent Access

All students in the College of Agriculture have access to Project Vincent and the other mainframes on campus. Full-time students pay a $40 computer fee per semester, and part-time students pay a sliding scale computer fee that depends on the number of credit hours they are taking.

Through Project Vincent, students have access to such programs as electronic mail, Netnews, and the World Wide Web. These programs allow students to communicate with friends and students at other universities and colleges. To use Project Vincent, students need to register for an account.

The easiest way to register for a Vincent account is to pick up the "Project Vincent Account Information" sheet outside room 197 Durham Center. From there, go to either room 139 or 248 in Durham Center. These two computer labs have several computer work stations that let you register for a Project Vincent account.

On the screen of the work station, the student will see three boxes. Click on the one that says "REGISTER" and follow the instructions. The registration process asks for information about the student and then checks that information against the information given to the Registrar's office. If everything matches, a Project Vincent account is created in about 24 hours.

If a student has problems registering for an account, he or she can go to the help room, 138 Durham Center. Students can register for classes on how to use Project Vincent in room 197 Durham Center and can obtain documentation for Project Vincent in room 195 Durham Center.

AG DIRECTORY

How to Contact the Clubs and Organizations that are a Part of the College of Agriculture

Undergraduate Clubs

Ag Business Club—Open to all agriculture majors but especially of interest to ag business majors. The club sponsors Ag Career Days and regular club meetings feature guest speakers. 294-5436

Ag Education Club—Professional leadership development organization to promote individual and group decision-making and cooperation among agriculture educators. 294-2583

Ag Studies/Farm Op Club—Involved in monthly meetings, including spring and fall field trips, picnics and an annual banquet. The club sponsors a Veishea food stand and display. 294-6924

Ag Systems Technology Club—Promotes an increased understanding of agricultural mechanization, leadership opportunities and fellowship among members. 294-5145

Agronomy Club—Promotes education and fellowship among students, faculty and other interested persons through trips, socials and speakers. 294-3846

Alpha Zeta—An honorary club dedicated to scholarship, character and leadership in agriculture. Activities include mock interviews, service projects and trips. 294-9595

Block and Bridle—The club organizes and coordinates activities that provide students the opportunity to practice leadership abilities. 294-3161

Dairy Science Club—Promotes fellowship and leadership among students interested in the dairy industry. 294-6649

Entomology Club—Provides students the opportunity to interact with one another on a personal and/or academic level. 294-7400

Fisheries and Wildlife Biology Club—Encourages concern for and understanding of wildlife resources; provides for interaction among students. 294-7991

Food Science and Human Nutrition—Promotes interest in the food industry and provides educational, social and recreational activities to its members. 294-7094

Forestry Club—Creates social interaction among students and develops professional interest in modern forestry topics. 294-1166

Horticulture Club—People with a common interest in plants gather in a social atmosphere to participate in educational activities related to horticulture. 294-0021

International Ag Club—Open to international ag majors and others interested. Activities include annual bake sale, Veishea display and monthly meetings. 294-7721

ISU Furharvesters' Club—Concerned with the wise use of fur-bearing animals through trapping. Activities include field trips, giving trapping demonstrations and sponsoring guest speakers. 296-8283

Meat Science Group—Stimulates interest and promotes academic excellence in meat science. Hosts and assists in the American Meat Institute Sausage Short Courses. 294-1548

National Agri-Marketing Association (NAMA)—Provides an opportunity to contact professionals, discover internship opportunities, explore careers and gain marketable experience. 294-5872

Pre-Vet Club—Monthly meetings include speakers who give members a chance to learn about the field of veterinary medicine. Activities include hayrack ride, vet school tours, picnics, Veishea and a Halloween pet costume party. 233-6054

Public Relations Student Society of America—Exists to promote information on careers and opportunities in PSA as it relates to agriculture and rural areas. 294-0497

Sigma Alpha—Provides an opportunity for women to share career and academic interests relating to agricultural fields. 294-7293

Graduate Clubs

Agronomy Graduate Student Club—Professional and social activities encourage cooperation, information exchange and good human relations among interested individuals. 294-8641

Entomology Graduate Student Organization—Formally voices student interests and concerns, promotes professional and educational enhancement and is a peer information source. 294-9346

Forestry Graduate Student Association—Sponsors forestry graduate student/faculty social and professional functions; represents department graduate students in faculty meetings. 294-1166

Meat Science Club—Stimulates interest and promotes academic excellence in meat science. Open to any interested graduate student. 294-1548

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UDDERANCES

A Look at What's Been Going on in the College of Agriculture

By Tami Schwarz

ISU Researchers Find Gene for Larger Pig Litters

Iowa State University researchers Max Rothschild and Carol Jacobson have isolated the estrogen receptor, or ESR, gene. They say that this discovery may make it possible to boost average litter size by up to one and a half pigs. Every pig has an ESR gene, but only a certain form of the gene carries the litter size increasing mechanism.

The researchers were able to locate the form of the gene for larger litter in a breeding herd owned by Pig Improvement Co., Inc. ISU and PIC researchers have also developed a test that will enable swine producers to test baby pigs for the presence of that form of the ESR gene.

Dave McLaren, PIC Inc.'s vice president of technical development, said the gene and associated screening test should make it possible for top producers to achieve 30 piglets or more per sow annually.

ISU has applied for a patent on the gene test. At present, PIC has an exclusive license to the gene test.

"This discovery gives us hope that we will make progress in finding genes that regulate other swine growth and performance traits," Rothschild said. Researchers at Iowa State are involved in a large-scale project to develop a map of swine genes. Studies on the ESR gene will continue to determine more precisely the extent of its influence on litter size.

Marple New President of American Society of Animal Science

Dennis Marple has been elected president-elect of the American Society of Animal Science. He will serve for a year and then become president in 1995-96. The American Society of Animal Science consists of more than 6,600 individual and institutional members in 112 countries.

Marple joined Iowa State in 1992 and is currently the head of the Department of Animal Science. Previously he had been head of the animal and dairy science department at Auburn University. Marple received his bachelor's and master's degrees from Iowa State and a doctorate degree from Purdue University.

Plant Introduction Superintendent Wins USDA Award

Larry Lockhart, the current superintendent of the U.S. Department of Agriculture's North Central Regional Plant Introduction Station at Iowa State University, recently received an award for outstanding achievement.

Lockhart received the National Plant Germplasm System Special Recognition Award for "demonstrating outstanding management, commitment and technical skills," according to the award citation. There was also a cash award accompanying the award.

Since 1985 Lockhart has served as the superintendent of the 120-acre station. The station supports a germplasm collection of more than 40,000 plant accessions representing about 1,100 plant species. It serves as part of the USDA Agricultural Research Service's National Plant Germplasm System.

Two ISU Plant Pathologists Receive Awards

Iowa State University plant pathologists Abraham Epstein and Forrest Nutter, Jr., recently received awards from the American Phytopathological Society.

Epstein received the North Central Distinguished Service Award for his work on the biocontrol of multiflora rose by using the rose rosette disease. He was also cited for his long-term service to the society and the North Central Division, specifically for his service as division president and as editor of *Phytopathology News*. This award is the highest honor to receive from this division.

Nutter received the Ciba-Geigy Award. This award is given to plant pathologists who have made significant contributions to the advancement of knowledge of plant diseases or their control. His research includes gray leaf spots on corn, foliar pathogens of alfalfa and soybean mosaic virus.

Both awards were presented at the society's national meeting in Albuquerque, NM in August.

Communication Help Lab for Agriculture Students

New this year for students taking classes in the college of agriculture is the Communications Laboratory. This lab is located in Curtiss Hall in room 213A.

The lab can help you with oral and written assignments along with help on learning to proofread, improving your organization, revising, preparing for presentations, and helping you to create and use transparencies.

The lab is open Monday, Wednesday, and Friday from 8 AM until 12 PM and Tuesdays and Thursdays from 2 PM until 5 PM. You can make appointments in advance by stopping by Curtiss 213A or calling 294-7550. Walk-in appointments are also being accepted. They ask that when you come to bring the assignment sheet given to you by your instructor for the lab personnel to look at along with a draft of the assignment. If there are any questions contact Lee-Ann Kastman, Directory of the lab at 294-7550.

Fretz Becomes Dean of Agriculture in Maryland

Thomas A. Fretz became Dean of the College of Agriculture as the University of Maryland, Directory of the Maryland Agriculture Experiment Station and of the Maryland Cooperative Extension Service on October 1.

Fretz started out as an undergraduate in horticulture at the University of Maryland. He then moved to the University of Delaware for his M.S. and Ph.D degrees in plant science.

Since 1989, he has been an associate dean at Iowa State University. Fretz feels fortunate to have been in Iowa during a time when state officials made it a priority to support agricultural research programs at Iowa State.

Kenealy Wins Purina Outstanding Teacher Award

Douglas Kenealy, professor of animal science at Iowa State University, was recently awarded the Purina Outstanding Teacher Award.

Kenealy was nominated by his fellow Dairy Science Faculty group at Iowa State. The award was based on his teaching activities. Kenealy was selected from among all the other applicants by a panel of judges. Dr. Kenealy was very pleased and at the same time very honored to have won such a prestigious award.

The awards banquet was held at the joint meeting of the American Dairy Science Association and the Animal Science Association national meeting in Minneapolis, MN on July 11-14. Also during the meeting were various business meetings, tours, the presenting of papers and many recognition banquets.

Along with this joint meeting was the National meeting of the Student Affiliated Divisions, which involves the collegiate delegates to the conference. ISU was well represented in the collegiate contests also. Angela Menke placed third in the National Undergraduate Paper Presentation. Menke's paper presentation concerned activity monitors for detecting heat in cows.

Anything new, exciting, and crucial happening in your department or club? Please let us know at the *Iowa Agriculturist*. We would like to write a short article for Udderances. Contact Tami Schwarz at 294-9381 or E-mail can be sent to dyqueen@iastate.edu.

CIKARD

Jonathan Sandor

Hopi Indians farm maize crops near their pueblo. The corn field is planted at the bottom of a hilly area, and the corn helps capture the runoff water that has gathered nutrients from the soil and the forests located on the hills.

By Paula Puffer

Most of us can remember the story of the pilgrims' first year here in America. We remember how much the pilgrims suffered and how the Native Americans in the Plymouth area helped them after that first winter. According to our history books, the Native Americans showed the pilgrims how to put a dead fish in each planted hill of corn to help fertilize the crop. Because of the Native Americans' help, the pilgrims had a good crop of corn that year and celebrated their bountiful harvest with a feast of thanksgiving.

The information the Native Americans gave the pilgrims on how to grow crops in New England is known as "indigenous knowledge." Indigenous knowledge is the unique local knowledge of a given culture or society. Because of the cultural aspect of the definition, indigenous knowledge is a characteristic of every human community. Examples of these communities are the Amish of Iowa, the Meskwaki settlement in Tama, the Quechua Indians of Peru, and the farmers who are members of the co-op in Slater. Within these groups, local knowledge of their environment is the basis for agriculture, environmental conservation, education, and many other activities. This knowledge is often passed from generation to generation by word of mouth as an oral tradition. The preservation of indigenous knowledge is at risk because of the threat of losing this oral tradition and the introduction of new technologies. This loss is one of the reasons that the Center for Indigenous Knowledge for Agriculture and Rural Development was founded.

ISU anthropology professor D. Michael Warren is the first appointed director of CIKARD. He began working on the proposal for CIKARD in 1986 with Daniel Zaffarano, former vice-president of research; George Christensen, former executive director for international affairs; John Pesek, former chair of agronomy; and others on the Deans' Council and in various departments. In 1987, CIKARD opened its doors as part of the Technology and Social Change Program.

Warren graduated with a B.A. in biology from Stanford University and spent the next few years in the Peace Corps. After his Peace Corps experience, he attended Indiana University where he received his Ph.D. in social and cultural anthropology. He joined the Anthropology staff at Iowa State in 1972.

Warren sees CIKARD as being important because of the wide variety of topics

covered. "It represents documents that tie with probably 30 different academic disciplines. . . . There are papers and research that represent indigenous therapeutic systems that deal with humans or with domesticated animals, approaches to wildlife, soil, and water management, climatology, and meteorology. It's not limited to just agriculture and rural development by a long shot."

Since its inception, CIKARD has helped in the establishment of a worldwide network of indigenous knowledge research centers. Early on, CIKARD staff recognized that establishing regional and national centers for indigenous knowledge would be the most cost-effective way of recording, documenting and using this knowledge. Keeping this view in mind, programs were developed to establish these regional and national resource centers. CIKARD has helped to establish 19 research centers worldwide, and 20 centers are in various stages of development. These main centers are located in the Philippines, Ghana, Brazil, The Netherlands, Cameroon, Burkina Faso, Indonesia, Kenya, Madagascar, Nigeria, Mexico, South Africa, Sri Lanka, Uraguay, and Venezuela. New centers in Papua New Guinea and Australia will be open by years's end.

CIKARD's goal is to record indigenous knowledge and make it available to local communities, development professionals and scientists. The center concentrates on four areas: indigenous innovations, knowledge systems (such as taxonomies), decision-making systems (such as what crops to grow on what soils) and organizations (such as farmers' groups).

Jonathan Sandor

A Quechuan farmer sorts soil taxonomy cards.

Indigenous knowledge is important for several reasons. Local knowledge can help development workers seeking solutions to agriculture and rural development matters that will work because local ways are considered. Many times solutions offered by professionals fail because the solutions do not fit with the local ways. Indigenous knowledge may suggest alternative methods that are not only applicable to the local system, but also usable in other societies.

Robert Fisher, a visiting professor from the University of Western Sydney-Hawkesbury, Australia, said, "There is an increasing recognition in rural development that farmers have local knowledge and that it should be used. Build on existing knowledge. Lots of technical agriculture solutions won't work and are inappropriate." Fisher also said, "It's recognized by international funding agencies that you need to start looking at local knowledge and legitimize what's already known."

Patricia Matteson, collaborator with Iowa State's department of entomology, uses CIKARD in her research and development of integrated pest management methods in developing nations. Matteson said she believes that it is important to know local information when working with other societies. "Indigenous knowledge is a source of ideas that scientists need to investigate," Matteson said. "CIKARD is a valuable resource and scientists going to developing nations should check traditional methods for usefulness in their research."

CIKARD is working toward the goal of spreading information to extension and development professionals. The center acts as a clearinghouse for collecting, documenting and publishing information on indigenous agriculture and rural development

Jonathan Sandor

These maize terraces in the Peruvian Andes have been farmed for 1,500 years by Quechuan farmers.

knowledge. The CIKARD library has more than 4,000 titles available as books, reprints or articles. People interested in obtaining specific kinds of information can write CIKARD and request the materials they are looking for. The requested materials are sent to the researcher.

Soon, these requests will be much easier to make. Abstracts of all this information are being written and put into a database. This database will be placed on the Consortium for International Earth Science Information Network Kiosk,which has several other databases located on it, and will useable by anyone with access to the Internet computer network.

Warren's work with CIESIN and the CIKARD database has led to his appointment as chairperson for CIESIN's Global Partner's Forum.

In 1987, CIKARD joined forces with the Leiden Ethnosystems and Development Program at Leiden University, and the Center for International Research and Advisory Networks in The Hague. Working closely with colleagues at the regional and national centers, these three organizations support global networking and information exchange by publishing the quarterly Indigenous Knowledge & Development Monitor and a global directory of individuals and institutions involved with indigenous knowledge research. The quarterly is sent to 4,000 individuals in 130 countries. CIKARD, CIRAN and LEAD also help by establishing uniform electronic communications, establishing database systems and translating key documents into French and Spanish.

CIKARD is involved with several projects worldwide and has helped pave the way for collaborative projects in international agriculture and rural development. These projects encompass many disciplines such as entomology, agricultural economics, agronomy and anthropology. Jonathan Sandor, an agronomy professor at Iowa State, has a research affiliation with and serves on the internal advisory board of CIKARD. He first became involved with indigenous knowledge studies while working in Peru. His work involved studying the soils of maize terraces that have been in use for at least 1,500 years. Sandor said, "With traditional lifeways being abandoned, CIKARD helps to record traditional knowledge in all areas." Sandor's statements echo those of Fisher and Matteson. "CIKARD serves an important function in making people aware of materials and making these things accessible. Indigenous knowledge is important because how can development occur that isn't acceptable to the local culture system? Failures occur when indigenous knowledge is not paid attention to. Indigenous knowledge makes ag development more likely to succeed because of the local base."

Patricia Matteson

In Sri Lanka, this plant is cut up into pieces and thrown into the rice paddy water. The sap contains an agent that acts as a pesticide.

A current project is the development of a training manual as part of the University Development Linkages Project, or UDLP, funded by USAID. The funding for this project was awarded to Iowa's three state universities, the Des Moines Area Community College, and four Nigerian institutes. The purpose of the manual is to develop methodologies which incorporate and record indigenous knowledge into agricultural and natural resource management programs. CIKARD is developing cost effective and reliable research methods that emphasize design procedures, sampling methods, statistical tools and interpretation of indigenous knowledge data. The training modules within the manual illustrate the procedure for recording indigenous knowledge systems using cases drawn from developing country situations. By writing the manual and developing these methods, CIKARD is helping to fulfill one of the goals of UDLP—to strengthen institutional capacities for research and training in key areas of development planning and management.

In the preface of *Indigenous Knowledge Systems for Agriculture and Rural Development: The CIKARD Inaugural Papers,* Christensen leaves the reader with these thoughts:

"CIKARD fits perfectly with Iowa State University's philosophy as a land grant institution—a university designed to work with and service the hopes, needs and desires of the citizens of Iowa as well as the nation and the world. Understanding indigenous knowledge systems facilitates communication between local citizens and development professionals and enhances the opportunities for truly participatory approaches to the development process. We at Iowa State University view CIKARD as a mechanism to strengthen our capacity to provide meaningful and sustainable development in our rapidly changing world."

S. S. I. K. D.

Students interested in indigenous knowledge and development can join the Student Society for Indigenous Knowledge and Development. The group meets twice a month and helps explore, catalogue, and promote indigenous knowledge systems and promote issues in international development. The group also helps to sponsor the annual CIKARD Lecture Series. For more information call the CIKARD office at 4-9503 or stop in room 318 Curtiss.

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